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ABSTRACT

This study was an investigation of the effects of narration and level of picture detail on children's recall of illustrated materials. Third and sixth grade students were randomly assigned to one of four treatment groups: groups one and two viewed two 7-frame stories accompanied by oral narration: groups three and four viewed the same stories without narration. Groups one and three differed from two and four in that the first story was low detail and the second was high detail, while groups two and four viewed the same stories in reversed detail level. The criterion tests consisted of 14 recall questions per story, seven about events relevant to the story, and seven about events irrelevant to the story. The tests were given immediately following the second story and again one week later. The results indicated that narrated stories facilitated recall significantly better than non-narrated stories: although low detail line drawings were remembered better than high detail pictures on the immediate test, the effect was not present on the delayed test: relevant events were recalled better than irrelevant events: and narration improved recall of irrelevant events more than of relevant events. (Author/CHC)

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*Narration, Detail and Event Relevance in Illustrated Materials

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Introduction

The investigation of the effects of pictures on information learning is a recently revived area of interest among educational researchers Pictures have been studied under many experimental paradigms - the paired-associate paradigm being most popular. In Pressley's 1977 review of the studies concerned with imagery, employing pictures as stimuli, and children's learning, approximately 75% of the studies cited employed paired-associate tasks. Fewer studies have investigated prose materials (e.g. Rohwer & Harris, 1975; Rohwer & Matz, 1975) or investigated the relationship between the pictures used and the type of task to be performed or information to be learned (e.g. Dwyer, 1968b).

Two theories have been proposed to account for the communicative benefit of degree of detail in pictures. The realism theories of Dale (1946/1969), Morris (1946), and Gibson (1954) hold that the closer the picture represents reality, that is, the more detail, the easier it is to remember and comprehend the information in the picture. An alternative notion is the "relevant cue" theory of Dwyer (see Parkhurst, 1975, p. 176), which holds that when irrelevant information is eliminated, that is, less detail is presented, the easier it is to remember and comprehend the picture.

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*Paper presented at annual convention of the Association for Educational Communications and Technology, Denver, April 21-25, 1980.

Dwyer (1968a) studied degree of picture detail with college and high school students but not with younger children. Pictures from a group of lessons on the heart varied from simple line drawings to detailed line drawings to photographs. These variations were examined in relation to the type of information to be learned and the task to be performed Dwyer found that simple line drawings were the most beneficial for most tasks and information types including drawing, identification, terminology definition, and comprehension. Realistic representations of the information, as conveyed in photographs, did not improve performance in these areas.

In a study comparing photographs, paintings, and line drawings, Moore and Sasse (1971) found that students from grades three, seven, and eleven could answer more questions regarding the content of the line drawings than the content of the former two picture forms. However, some methodological problems can be found in the study. First, only nine pictures were used, three of each type being investigated. Each picture followed the same criteria for selection, such as no action and limited popular exposure, but the content of each picture was different. A more advantageous approach would be to keep picture content constant. Second, the questions about the pictures were asked immediately after each individual picture was shown. This procedure does not parallel classroom learning conditions, in which a block of information is usually presented before testing. Finally, because all questions were programmed into the timed presentation, each student was forced to answer questions at the same rate. Because of the above problems results and conclusions from the study have limited generality

In studies that examined comparative effects of narration, pictures, and narration plus pictures on children's recall of information (Guttmann, Levin,

and Pressley, 1977; Rohwer & Harris, 1975; Rohwer & Matz, 1975), results indicate that narration plus pictures is the most effective treatment. If pictures and narration are more effective than pictures alone, verbal description may interact with the amount of detail present. Photographs with verbal description may be as effective as simple line drawings alone (see Guttmann et al, 1977).

The type of information to be learned can be categorized a number of ways. The foreground/background relationship or story relevant/story irrelevant information can be examined in prose learning studies. More story relevant information should be remembered than story irrelevant information. However, if narration is added, a strong cuing effect should be apparent and eliminate the superiority of the relevant events.

The purpose of this study is to investigate if, and to what extent, the amount of detail present in pictures has an effect on recall by children. By adding a narration of the information portrayed by the pictures, the interactive effect of picture detail and verbal description was examined in relation to children's performance on a recall test. Also, by testing the relevant and irrelevant information in narrated and non-narrated situations, the impact of narration on information type in prose learning was examined. The major hypotheses to be tested here were:

1. All picture plus narrative treatments facilitate recall of the information presented better than pictured passages without narration.
2. Low detail line drawings facilitate recall of pictured information better than high detail line drawings.

3. High detail line drawings and low detail line drawings are equally effective when accompanied by narration.
4. Story relevant information is recalled better than story irrelevant information.
5. Story relevant and story irrelevant information in pictures are recalled equally well when the pictures are accompanied by narration.

Method

Subjects

Subjects were 81 third graders and 93 sixth graders from two, middle-class suburban schools in the Southwest.

Stimulus Materials

The treatment materials consisted of two seven-frame slide/tape stories adapted from a professionally developed reading series. The pictures for the slides were produced in two degrees of detail; high detail line drawings were taken directly from the series and low detail line drawings were abstracted from the originals by the experimenter by tracing. The two styles are shown in Figure 1.

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Insert Figure 1 about here

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The low detail pictures retained the outline shapes of the major characters and lines necessary to retain the perspective of the picture and convey the meaning of the picture. For example, the meaning of the picture from the "Man and Woman" story in Figure 1 was that the woman was in a messy kitchen. Therefore, simple information that would convey that meaning was retained and extraneous details, such as the mice, were omitted.

Figure 1. First picture in the "Man and Woman" story.

In the other story about "Kids", these same detail considerations were applied. The horizon line was retained for perspective because this story takes place outside in a playground. A frog defines a pond which is an important element for later in the story. However, embellishing details such as trees, reeds, and designs on the clothing were omitted.

Another modification of the pictures was the addition of an irrelevant event to each picture. These irrelevant events were irrelevant to the story line. For example, the major story line of the "Kids" story concerns the interaction of three children and a hat. Every frame also contains an irrelevant event such as an airplane flying in the sky or a baseball bat and ball lying beside a park bench that does not contribute directly to the story line of the children and the hat. These irrelevant events were always located in the background and the relevant events were always in the foreground. Relevant and irrelevant events were represented in each frame of both stories.

A taped narration was also provided to two of four treatment groups. The narration was a description of all relevant and irrelevant events of the stories. Each frame had an associated two or three sentence passage of description that was between eight and ten seconds long. The narration was written by the experimenter with content and level approved by practicing elementary teachers and pilot tested with a nursery school child. Meaning was judged to be clear in both cases.

The order of the relevant event description and irrelevant event description was randomly varied throughout the stories such that four times out of seven the relevant event was described first and the remaining three times the irrelevant event was described first for each frame.

Criterion Test

The criterion test consisted of 28 short answer questions about narrated and/or pictured information. Fourteen questions were asked about each story, two questions per picture. One of the questions was about a relevant event and one was about an irrelevant event. Figure 2 lists example of relevant and irrelevant event questions from each story. The question order paralleled the story order, "Kids" then "Man and Woman", and the story line of each story.

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Insert Figure 2 about here

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Each question was worth two points. One point was given to answers that were plausible answers but not evident of a non-guess response. For example, when asked what kind of table was in the playground, if the student answered 'wooden' one point was given. The correct answer was 'picnic' which was given two points. The inference that the table was wooden was acceptable as an inference but the table may well have been plastic. The answer was not entirely wrong as the answer 'dining room table' would be, therefore the student was not penalized with no points.

Twenty-eight points were possible for each story for a total of 56 points for the entire test. Students received a relevant event score and an irrelevant event score as well as a high detail score and low detail score for analysis purposes.

Procedures

Within each school each student was randomly assigned to one of four treatment groups. The first group viewed the low detail "Kids" story and the high detail "Man and Woman" story. The second group viewed the high detail

THE MAN AND WOMAN

1. WHAT WAS WRONG WITH THE KITCHEN?

_____

2. WHERE WAS THE FISHING POLE IN THE KITCHEN?

_____

THE KIDS

1. WHAT WAS THE BOY WITH THE HAT DOING IN THE FIRST PICTURE?

_____

2. HOW MANY CHILDREN WERE SWINGING IN THE PICTURE?

_____

Figure 2. Representative relevant and irrelevant event questions from both stories.

"Kids" story and the low detail "Man and Woman" story. Both the first and second treatments were narrated. The third group viewed the same pictures as the first group. The fourth group viewed the same pictures as the second group. Neither the third nor the fourth group heard a narration

Each treatment was administered in different locations concurrently Students were told that they were participating in an experiment to find out how children learn. They were then instructed to listen to the voice on the tape recorder The projection screen was blank. The tape recorded message was:

> "You are about to see (or see and hear, depending on the treatment group) two stories. One is about a man and woman and the other is about some children. Pay attention to what you see (and hear) because you will be asked questions about them afterward."

The slides were advanced automatically by a synchronizing inaudible pulse on the tape. Students first viewed the appropriate version on the "Kids" story which always advanced at the same rate with or without narration. Rate was determined by the amount of time necessary to speak the two or three sentences associated with the frame in the narrated treatment. A black slide appeared between the stories for approximately six seconds. The students then viewed the appropriate version of the "Man and Woman" story which also advanced at the same rate with or without narration.

After viewing the stories students received a copy of the test questions. They were told that the questions would be read aloud to them by the experimenter and to answer as well as they could. They were also told that it was permissable to leave blanks if they didn't know an answer. The experimenter read each question and allowed approximately 12 seconds between questions for answering No student indicated problems with keeping up this pace.

One week later the test was readministered in classrooms. Students did not know the delay test was to take place. The same procedure of test administration was followed on the retest.

Design

The design of the experiment was a 2 (narration) X 2 (data level) X 2 (event type) X 2 (test trial) factorial design. Narration was a between subject factor with all other factors within subjects.

Results

Tables 1 and 2 display all means and cell sizes for immediate and delayed tests respectively. The statistical results were obtained by using a series of repeated measures ANOVA for main effects of the within-subject factors and their interactions with the between-subjects factor. Table 3 displays the summary results of these analyses. An independent T-test was used to test the difference between the means of the two levels of the narration factor.

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Insert Tables 1, 2 and 3 about here

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Narration

Significant main effects were obtained for the narration variable on both the immediate and delayed tests. The students in the narrated treatment groups scored significantly higher than the students in the non-narrated treatment groups, t (172) = 15.97, p <.001, on the immediate test with means equal to 42.82 and 25.41 respectively, and t (154) = 11.05, p < .001, on the delay test, means equal to 40.81 and 25.89 respectively.

Picture Detail

The low detail pictures allowed for significantly better recall of information than the high detail pictures on the immediate posttest, $F(1,172)$ = 5.60, p = .019, means equal to 17.64 and 16.55 respectively. The main effect was not significant on the delayed test.

Table 1

MEAN SCORES ON IMMEDIATE TEST

Narration	N		Detail		Event Relevance		Totals*
			High	Low	Relevant	Irrelevant	
Present	88	$\bar{X}$	21.33	21.47	24.25	18.59	42.82
		SD	3.90	3.65	2.86	4.37	6.27
Absent	86	$\bar{X}$	11.76	13.73	18.37	6.96	25.41
		SD	5.49	5.30	5.25	3.84	8.02
Totals	174	$\bar{X}$	16.55	17.64	21.34	12.84	34.22
		SD	6.74	5.96	5.13	7.13	11.26

*Note: Totals for the narration factor are based on the total 28 item test. The means for the within-subject factors of detail and event relevance are based on 14 items for each level of the factor (14 high + 14 low, 14 relevant + 14 irrelevant).

Table 2

MEAN SCORES ON DELAY TEST

Narration	N		Detail: High	Detail: Low	Event Relevance: Relevant	Event Relevance: Irrelevant	Totals*
Present	78	$\bar{X}$	20.70	20.21	22.43	18.29	40.81
		SD	4.58	4.44	4.25	4.72	8.39
Absent	78	$\bar{X}$	12.41	13.50	17.58	8.29	25.89
		SD	5.46	5.61	5.24	4.44	8.44
Totals	156	$\bar{X}$	16.56	16.86	20.01	13.29	33.35
		SD	6.52	6.07	5.34	6.79	11.09

*Note: Totals for the narration factor are based on the total 28 item test. The means for the within-subject factors of detail and event relevance are based on 14 items for each level of the factor (14 high + 14 low, 14 relevant + 14 irrelevant).

Table 3

Summary of the Repeated Measures ANOVA for the Three Within-Subjects Factors

Source	df	Mean Square	F	p
		Detail		
Immediate				
Mean	1	101399.80469	3912.32410	<.001
Narration	1	6514.01794	251.33135	<.001
Error	172	25.91805		
Detail	1	97.10577	5.60447	.019
Detail X Narration	1	73.65753	4.25115	.041
Error	172	17.32649		
Delay				
Mean	1	87100.45996	2669.37122	<.001
Narration	1	4394.99719	134.69365	<.001
Error	154	32.62958		
Detail	1	7.08011	.38461	.536
Detail X Narration	1	48.49036	2.63411	.107
Error	154	18.40863		
		Event Relevance		
Immediate				
Mean	1	101086.10156	3854.74283	<.001
Narration	1	6682.86414	254.07675	<.001
Error	172	26.22382		
Event Relevance	1	6333.85950	742.99323	<.001
Event Relevance X Narration	1	718.48569	84.28195	<.001
Error	172	8.52479		
Delay				
Mean	1	86500.00098	2554.34656	<.001
Narration	1	4305.38245	127.13802	<.001
Error	154	33.86385		
Event Relevance	1	3513.48767	354.66026	<.001
Event Relevance X Narration	1	515.38777	52.02453	<.001
Error	154	9.90663		

Table 3 (continued)

Summary of the Repeated Measures ANOVA for the Three Within-Subjects Factors

Source	df	Mean Square	F	p
		Test Trial		
Mean	1	350543.84766	3223.90228	< .001
Narration	1	19681.01562	181.00352	< .001
Error	154	108.73278		
Test Trial	1	52.51282	3.77128	.054
Test Trial X Narration	1	155.12814	11.14074	.001
Error	154	13.92440		

Event Relevance

A significant difference was found between relevant event scores and irrelevant event scores, $F(1,172) = 742.99$, $p < .001$, on the immediate test with means equal to 21.34 for the relevant event and 12.84 for the irrelevant event, and $F(1,154) = 354.66$, $p < .001$, on the delay test with means equal to 20.01 for the relevant event and 13.29 for the irrelevant event. Students remembered more relevant events than irrelevant events.

Interactions

A significant interaction occured on the immediate posttest between narration condition and picture detail. The difference between low detail scores and high detail scores in the narrated treatment was significantly less than the difference between the low detail scores and high detail scores in the non-narrated treatment, $F(1,172) = 4.25$, $p = .041$. Figure 3 graphically displays this interaction.

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Insert Figure 3 about here

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Two interactions were also noted for the event relevance factor. The difference between the relevant event means and irrelevant event means in the narrated treatment was significantly less than the difference between the relevant event means and the irrelevant event means in the non-narrated treatment, $F(1,172) = 84.28$, $p < .001$, on the immediate test and $F(1,154) = 52.02$, $p < .001$, on the delay test. Figure 4 graphically displays these interactions.

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Insert Figure 4 about here

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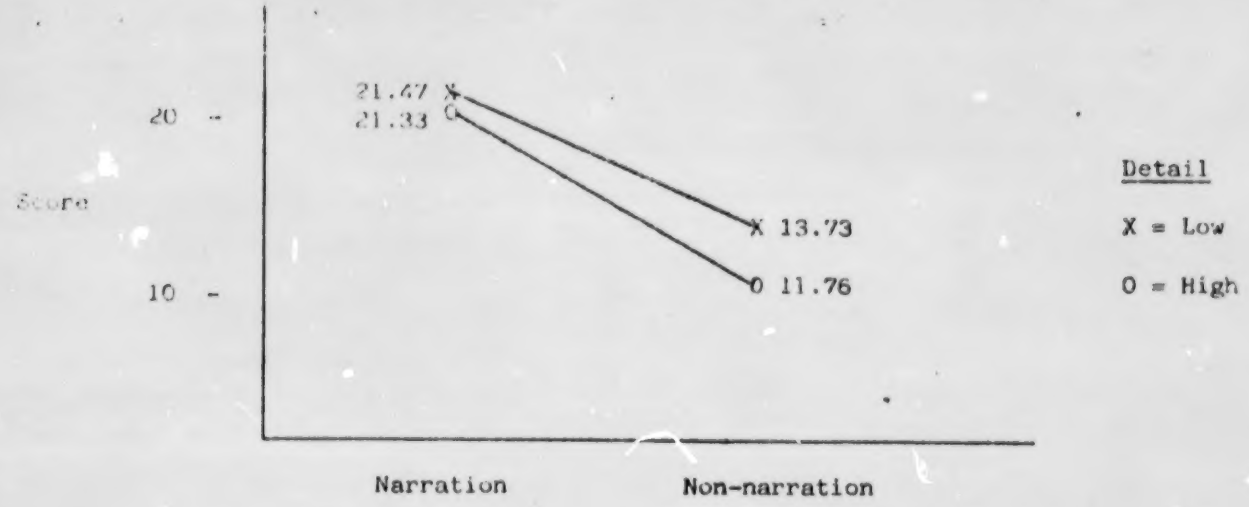

Figure 3. Graph of detail X narration interaction.

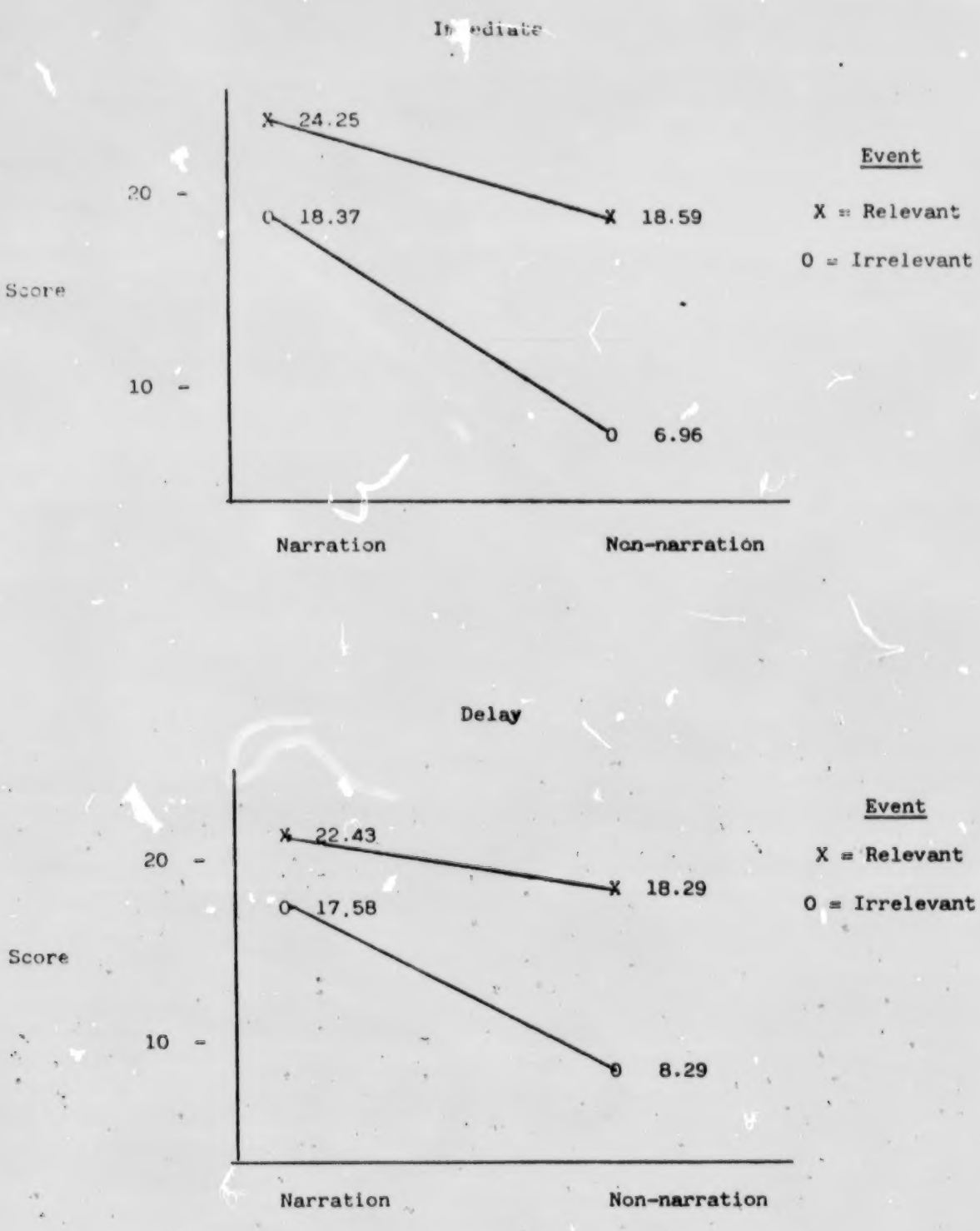

Figure 4. Graphs of event type X narration interactions on the immediate and delay tests

Other Findings

The difference between the means on the immediate and delay test approached significance, $F(1,154) = 3.77$, $p = .054$, with means of 34.22 and 33.35 respectively. A significant interaction between narration and test trial was noted, $F(1,154) = 11.14$, $p = .001$. The performance of the students receiving the narrated treatment decreased significantly more on the delayed test than the performance of the students receiving the non-narrated treatment. This interaction is graphically displayed in Figure 5.

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Insert Figure 5 about here

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Discussion

The purpose of this study was to investigate the effects of narration, amount of detail, and event relevance on children's recall of information in a story. Immediate and delay posttest results were obtained.

Narration

The narrated treatment group scored extremely higher than the non-narrated treatment group on both the immediate and delay test. Thus, the hypothesis that picture plus narrative treatments facilitate recall of information presented better than pictured passages without narration is accepted.

Detail

The results of the test of the detail factor were not as conclusive. On the immediate test, low detail pictures facilitated recall better than high detail pictures, $p = .019$. However, on the delay test the effect disappeared. When the actual means were examined on a practical basis, only one point separated the

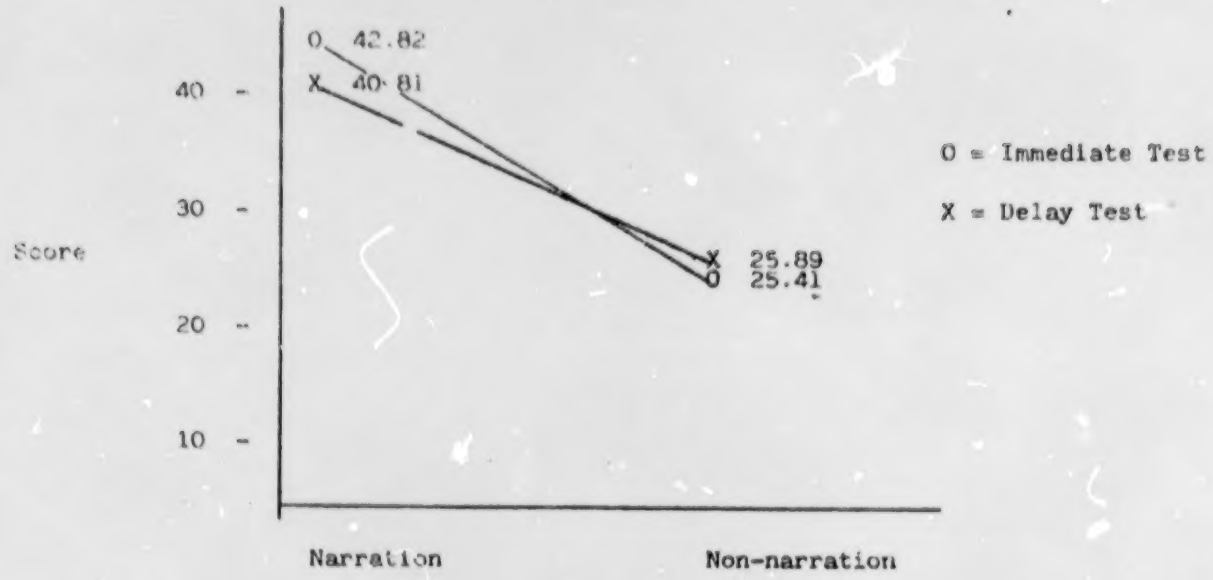

Figure 5. Graph of test trial X narration interaction.

means on the immediate test. Therefore, even though a statistically significant difference was achieved on the immediate test, the actual mean difference was so small as to have little practical significance. Thus, the hypothesis that low detail line drawings facilitate recall of pictured information better than high detail line drawings is rejected.

The effect of narration with regard to level of detail is also questionable. Statistically, narration did improve the effect of high detail line drawings so that it equalled the effectiveness of low detail line drawings on the immediate test. Again, this effect disappeared on the delay test because no difference existed between high and low detail levels. In other words, when a difference between high and low detail levels exists, added narration overcomes the superiority of low detail. Thus, the hypothesis, high detail line drawings and low detail line drawings are equally effective when accompanied by narration, is supported.

Event Relevance

The effect of event relevance on information recall was found to be very strong. Relevant events were better recalled than irrelevant events on both the immediate and delay test with mean differences of eight and seven points respectively. The hypothesis that events relevant to the story are recalled better than events irrelevant to the story is accepted.

The effect of narration with regard to event relevance was very strong. When relevant and irrelevant events were described in a narration, there was less difference between the means (six points) than when no narration was present (12 points) on the immediate test. On the delay test the mean differences for the event relevance factor were five points for the narrated condition and ten points for the non-narrated condition. Examination of the cell means shows that the narrated irrelevant events were remembered as well as the non-narrated relevant

[illegible], the hypothesis that story relevant and story irrelevant information in pictures are recalled equally well when a narration is present cannot be accepted because means were not equalized in the narration treatment. However, it could be stated that narration improves recall of irrelevant events more than relevant events.

Test Trial

Although no hypotheses were suggested regarding the test trial factor, some interesting results were obtained. Test trial as a main effect did not reach significance, $p = .054$. The actual mean difference was less than one point. Students tended to recall the stories after a week regardless of the treatment conditions.

The effect of narration with regard to test trial was also interesting. Students receiving narration recalled less after a week than students receiving no narration. In fact, the non-narrated treatment group mean increased .5 points on the delay test. The narrated treatment group mean dropped two points on the delay test.

Conclusions

Several interesting conclusions that have practical value can be drawn from this study. Also, some additional questions are raised.

Practical Applications

The effect of narration on recall is great. Whenever possible narration should be provided with picture sequences of a story nature. Narration overcomes the effect of picture detail and improves recall of less important events in the story. Students recall more of everything, not just main events. In addition, even though less information is retained over time when narration is provided and the same amount of information is retained when narration is not provided, the amount forgotten is negligible so as not to affect the superiority of narration.

The effect of level of detail in line drawings does not seem to be consequential over time. In the short run, low detail line drawings facilitate recall better than high detail line drawings. Over time, it doesn't appear to make any difference whether detail is high or low. The addition of narration improves the effectiveness of high detail line drawings. But, over time, this boost also disappears. It seems that it is more important to be concerned with providing narration than to be concerned with detail in the pictures. When narration is not an option, low detail pictures will facilitate recall better than high detail pictures.

Narration also affects the memorability of irrelevant and relevant events. When presenting a story without narration, events relevant to the story line will be easier to recall than less relevant events. To increase the number of less relevant events remembered, a narration should be added. This also will increase the number of relevant events remembered.

Theoretical Concerns

As a result of this study, the realism theory versus "relevant cue" theory debate is put in a different light. The strong effect of narration overwhelms the concern for detail level in line drawings. In this study, results showed that low detail representations (relevant cue) were as equally effective as high detail representations (realism) over time. It was more important to consider the complexity of the media, narration plus pictures, and the importance of the content to the story being told (event relevance).

Further Research

At least two lines of further research seem appropriate based on the present findings. One involves investigation of the retention of information and its relationship to picture characteristics. The second relates to the degree of detail

differences necessary to elicit recall differences. Research on these issues should help increase our understanding of the effects of picture characteristics on short-term and longer-term memory for meaningful material.

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